

# **METHODS AND APPARATUS FOR CONTENT PROTECTION IN A WIRELESS NETWORK**

## **BACKGROUND**

### **I. FIELD**

[0001] The present invention relates generally to the operation of data networks, and more particularly, to methods and apparatus for protecting content in a wireless data network.

### **II. DESCRIPTION OF THE RELATED ART**

[0002] Advances in technology have resulted in the development and deployment of extensive data networks. These networks include both public data networks, such as the Internet, and specialized networks, such as wireless telecommunication networks. Users of these networks have the ability to access a wide variety of information and services that are available as network resources.

[0003] One example where there is an increasing demand for network resources is in wireless network environments. In wireless environments, a variety of wireless devices, such as wireless telephones, personal digital assistants (PDAs), and paging devices, communicate over a wireless network. The wireless network may also include network servers that operate to provide various network resources to the wireless devices. Furthermore, the wireless networks may also be coupled to a public network, such as the Internet, so that resources on the public network can be made available to the wireless devices on the wireless network.

[0004] One area of concern for application and content developers is that of content protection. Content protection is becoming very important in wireless networks due to the improvements in air-link data speeds and the proliferation of end-users purchasing applications and related content via wireless devices. For example, applications and content purchased by one device user can be easily distributed to other device users. As a result, it is possible for device users to avoid paying various purchase and license fees to application and content developers. Thus, application developers and content providers must address the problem of having their applications or content pirated and/or distributed to other wireless devices or desktop computers without receiving the associated fees.

[0005] Therefore, what is needed is a system that operates to protect applications and content from unauthorized acquisition, operation, and/or distribution.

## SUMMARY

[0006] In one or more embodiments, a protection system comprising methods and apparatus is provided that operates to protect content available on a data network from unauthorized acquisition, operation, and/or distribution. For example, in one embodiment, an application or content distribution server (server) is able to limit the purchaser of the application or content to operation within a predefined geographic location. Once the purchaser's device is outside the predefined location, the application or content will not be accessible from the server.

[0007] In one embodiment, the server flags "high value" applications or content for usage restriction within a predefined geographic region. Thus, the application or content is provided with a geographic privilege that can be based on any one of a variety of geographic identifiers. For example, the geographic privilege can be based on a global positioning system (GPS) location, a base station location, a system identifier (SID), a network identifier (NID), an area code, or other geographic identifier.

[0008] Once the geographic privilege is enable upon the application or content download, the end-user is restricted to running the application or viewing the content only within the region identified by the geographic identifier. Thus, the application and/or content are protected from unauthorized acquisition, operation or distribution because they are only available within predetermined regions and therefore cannot be used by devices that are outside the region.

[0009] In one embodiment, a method is provided for operating a protection system to protect an application from unauthorized distribution, wherein the application will fail to operate on a device that is outside a predetermined operating region. The method comprises associating a geographic identifier with the application, wherein the geographic identifier identifies the predetermined operating region, and downloading the application and the geographic identifier to the device. The method also comprises receiving a request to execute the application on the device, wherein the request includes the geographic identifier, and determining a device location. The method also comprises comparing the device location with the predetermined operating region

identified by the geographic identifier, and preventing the application from executing when the device is outside the predetermined operating region.

[0010] In another embodiment, apparatus is provided that operates to protect an application from unauthorized operation, wherein the application will fail to operate on a device that is outside a predetermined operating region. The apparatus comprises a geographic database that operates to associate the application with a geographic indicator that identifies the predetermined operating region. The apparatus also comprises processing logic that operates to match a device location with the predetermined operating region identified by the geographic indicator to determine whether the device is outside the predetermined operating region, wherein if the device is outside the predetermined operating region the application is prevented from operating.

[0011] In another embodiment, apparatus is provided that operates to protect an application from unauthorized operation, wherein the application will fail to operate on a device that is outside a predetermined operating region. The apparatus comprises means for associating the application with a geographic indicator that identifies the predetermined operating region, and means for matching a device location with the predetermined operating region identified by the geographic indicator. The apparatus also comprises means for determining whether the device is outside the predetermined operating region, and means for preventing the application from operating if the device is outside the predetermined operating region.

[0012] In another embodiment, a computer-readable media is provided that comprises instructions that when executed by a processor in a protection system operate to protect an application from unauthorized operation, wherein the application will fail to operate on a device that is outside a predetermined operating region. The computer-readable media comprises instructions for associating the application with a geographic indicator that identifies the predetermined operating region, and instructions for matching a device location with the predetermined operating region identified by the geographic indicator. The computer-readable media also comprises instructions for determining whether the device is outside the predetermined operating region, and instructions for preventing the application from operating if the device is outside the predetermined operating region.

[0013] Other aspects, advantages, and features of the present invention will become apparent after review of the hereinafter set forth Brief Description of the Drawings, Detailed Description of the Invention, and the Claims.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

[0014] The foregoing aspects and the attendant advantages of the embodiments described herein will become more readily apparent by reference to the following detailed description when taken in conjunction with the accompanying drawings wherein:

[0015] **FIG. 1** shows a data network that comprises one embodiment of a protection system for protecting applications or content from unauthorized acquisition and/or distribution;

[0016] **FIG. 2** shows a functional block diagram illustrating one embodiment of a protection system that operates to protect applications and content from unauthorized acquisition and/or distribution;

[0017] **FIG. 3** shows one embodiment of a method for operating a protection system to protect applications or content from unauthorized acquisition and/or distribution; and

[0018] **FIG. 4** shows one embodiment of a geographic database for use with the protection system of **FIG. 2**.

## **DETAILED DESCRIPTION**

[0019] The following detailed description describes a protection system that operates to protect applications and content from unauthorized acquisition and/or distribution. In one embodiment, the system operates to assign a geographic privilege to selected applications and content available at a content server. For example, the geographic privilege identifies a geographic boundary (or region) that is used to limit the operation of the application or content. The geographic boundary can define a region, country, state, city, district within a city, or any other geographic location.

[0020] In one embodiment, the content server that provides the application or content informs the purchaser of the application or content that a geographic restriction exists. The purchaser is then able to specify a geographic boundary in which that application or content is to be used. For example, the purchases may select one of several predefined regions in which the application or content is to be used. Once the geographic privilege

is associated with the application or content, it will only operate within the selected region. Thus, in one embodiment, should the user attempt to run the application or content outside the selected region, the user is informed that the application or content is unavailable since the device is outside the selected region. Once the user moves the device back inside the selected region, the application or content becomes available again.

[0021] In one or more embodiments, the protection system is suitable for use with a variety of wired or wireless devices. For example, the wireless devices may be any type of wireless device, including but not limited to, a wireless telephone, pager, PDA, email device, tablet computer, or other type of wireless device.

[0022] **FIG. 1** shows a data network **100** that comprises one embodiment of a protection system for protecting applications or content from unauthorized acquisition and/or distribution. The network **100** comprises a wireless device **102** that communicates with a wireless data network **104** via a wireless communication channel **106**. The network **100** also comprises a server **108** that operates to provide services to the wireless device **102** and other entities in communication with the network **104**. The server **108** is coupled to the network **104** by link **110**, which may be any type of wired or wireless link. For example, in one embodiment, the wireless device **102** may be a wireless telephone, and the server **108** may be part of a nationwide telecommunications network that provides applications and/or multimedia content to the device **102**. Also coupled to the network **104** is a second wireless device **112** that is located in a different geographic from the device **102**.

[0023] During operation of the protection system, content provided by the server **108** to the device **102** is protected so that the content is only accessible when the device **102** is in a selected geographic area. For example, in one embodiment, the server **108** includes various applications and content **116** that are available for download to the device **102**. The device **102** contacts the server **108** and requests to download an application, for example, the application App1. The server **108** “tags” or marks the application with a geographic indicator and transmits the application App1 to the device **102** as shown at path **118**. The geographic indicator indicates that the application App1 may be operational or accessible when the device **102** is within a geographic region defined by the boundary **114**. As long as the device **102** remains within the geographic region defined by the boundary **114**, App1 will be accessible to the device **102**. If the device **102** moves outside the bounded region, App1 will be disabled or not accessible.

[0024] If the device **102** transmits the application App1 to the device **112**, for example, by transmitting the application over path **120**, the application will fail to function, because device **112** is outside the region defined by the boundary **114**. Thus, the protection system operates to protect applications and content from unauthorized distribution because if the application or content is distributed to a device outside a predefined region associated with the application or content, it will fail operate or it will not be accessible to that device.

[0025] **FIG. 2** shows a functional block diagram illustrating one embodiment of a protection system **200** that operates to protect applications and content from unauthorized acquisition and/or distribution. For example, the protection system **200** is suitable for use in conjunction with or as part of the server **108** to protect applications and content available at the server that are downloaded to the wireless device **102**.

[0026] The protection system **200** comprises processing logic **202** that is coupled to an internal data bus **204**. Also coupled to the internal data bus **204** are memory **206**, user interface **208**, and I/O interface **210**. The protection system **200** also comprises a geographic database **212** coupled to the processing logic **202** and an application memory **214** coupled to the internal bus **204**. The application memory **214** comprises one or more applications or other content **220** that is available for download.

[0027] In one or more embodiments, the processing logic **202** comprises a CPU, gate array, hardware logic, software, or a combination of hardware and software. Thus, the processing logic **202** generally comprises logic to execute machine-readable instructions.

[0028] The memory **206** comprises RAM, ROM, FLASH, EEROM, or any other suitable type of memory, or a combination thereof. In one embodiment, the memory **206** is located internal to the integrity system **200**, and in another embodiment, the memory **206** comprises a removable memory card or memory device that may be selectively attached to the integrity system **200**, and thereby couple to the internal bus **204**. Thus, the memory **206** may comprise virtually any type of memory that is capable of storing instructions that may be executed by the processing logic **202**.

[0029] The user interface **208** receives user input **216**, for example, from a keypad, pointing device, touch pad, or other input mechanisms to allow a user to interact with the device **102**. The user interface **208** may also couple to a display device, such as a CRT, LCD, LED, or any other type of display device to provide a visual display to the

user. Any other type of input or output device may also be coupled to the user interface **208**, such as, disk storage, audio logic, video devices, etc.

[0030] The I/O interface **210** operates to transmit and receive information between the protection system **200** and external devices, systems, and/or networks using the communication link **218**. For example, in one embodiment, the network interface **210** comprises a radio transceiver circuit (not shown) that operates to transmit and receive information over a wireless data network using the communication link **218**. For example, the communication link **218** may be the communication link **106** shown in **FIG. 1**. For example, the transceiver comprises circuitry that modulates information received from the processing logic **202** and converts the modulated information into high frequency signals suitable for wireless transmission. Similarly, the transceiver also comprises circuitry to convert received high frequency communication signals into signals suitable for demodulation and subsequent processing by the processing logic **202**.

[0031] In another embodiment, the I/O interface **210** comprises a transceiver that operates to transmit and receive information over a hardwired communication link, such as a telephone line, or other type of data line, to communicate with a remote system on a public data network, such as the Internet.

[0032] In still another embodiment, the I/O interface **210** comprises circuitry that operates to communicate with local devices, such as a local workstation. The I/O interface **210** may also include circuitry (such as serial or parallel port logic) to communicate with a printer or other local computer or device, such as floppy disk or memory card. Thus, the I/O interface **210** may comprise any type of hardware, software, or combination thereof to allow the integrity system **200** to communicate with other local or remotely located devices or systems.

[0033] In one embodiment, the geographic database **212** comprises a CPU, processor, logic, memory, software, or any combination of hardware and software. The geographic database **212** is coupled to the processing logic via the link **222** and operates to provide geographic indicators to the processing logic **202**. The geographic indicators identify one or more geographic regions that may be associated with the applications and content **220**. For example, the geographic indicators are used by the processing logic **202** to tag or mark an application or content for operation within a selected geographic region. After the application or content is tag with a geographic indicator, the application or content is transmitted to the device **102**, and as a result, the

application or content will only operate or be accessible to the device **102** when the device is located within the selected geographic region indicated by the associated geographic indicator.

[0034] It should be noted that the configuration of the protection system **200** is just one configuration suitable for implementing one embodiment of the protection system **200**. It is also possible to implement the protection system **200** using other functional elements or element configurations within the scope of the present invention.

[0035] During operation of the protection system **200**, the processing logic **202** executes program instructions stored in the memory **206** to perform the functions described herein. For example, in one embodiment, the protection system **200** performs the described functions when the processing logic **202** executes program instructions stored in the memory **206**. In another embodiment, the program instructions are stored on a computer-readable media, such as a floppy disk, CD, memory card, FLASH memory device, ROM, or any other type of memory device. The program instructions are loaded into the memory **206** via the I/O interface **210**. For example, the protection system **200** may download the program instructions from the computer-readable media into the memory **206** via the I/O interface **210**.

[0036] **FIG. 3** shows one embodiment of a method **300** for operating a protection system, for example, the protection system **200** to protect applications or content from unauthorized acquisition and/or distribution. For example, the method **300** will be described with reference to the protection system **200** shown in **FIG. 2**. It will be assumed that the protection system **200** is coupled to a data network so that the system **200** may communication with a client device, for example, the device **102**.

[0037] At block **302**, the device sends a request to obtain an application or multimedia content. For example, the device **102** sends a request to the protection system via the wireless network **104**.

[0038] At block **304**, the protection system operates to query the device as to what geographic area the application will be used in. In one embodiment, the device user is provided with a dialog box that allows the device user to select from a list of regions where the application may be used. For example, the protection system communicates with the device **102** via the wireless network **104**, and responses entered by the device user are transmitted back to the protection system over the same network path.

[0039] At block **306**, the protection system receives the region selection from the device user and operates to tag the desired application with a geographic indicator



representative of the selected region. For example, the processing logic **202** retrieves the selected application from the memory **214** and retrieves a geographic indicator from the database **212**. The geographic indicator is generated based on the desired operating region provided by the device user. The processing logic **202** then tags the application with the geographic indicator. For example, in one embodiment, the geographic indicator may be a digital signature that is generated by the protection system that can be mapped to the desired operating region.

[0040] At block **308**, the selected application and the geographic indicator are downloaded to the device. For example, the protection system downloads the tagged application to the device **102** via the wireless network **104**.

[0041] At block **310**, the device attempts to run the application on the device. When the application begins executing on the device, the application contacts the protection system. For example, the application may require information or other content before executing on the device **102**. The application contacts the protection system to request the information and provides the geographic indicator that was tagged to the application.

[0042] At block **312**, the protection system receives the device's request, and in response, the protection system determines device location. For example, in one or more embodiments, the protection system determines the location of the device **102** by using a global positioning system (GPS) location, a base station location, a system identifier (SID), a network identifier (NID), an area code, or other device location information that may be available.

[0043] At block **314**, the protection system performs a test to see if the location of the device is within the predefined geographic location that is associated with the application the device is attempting to run. For example, the protection system uses the geographic indicator to determine the authorized operating region for the application. For example, the processing logic **202** uses the geographic indicator to access the database **212** to map back to the authorized operating region for the application. The processing logic then matches the device location and the authorized operating region to see if the device is located within the authorized region. For example, the processing logic uses any type of matching technique to match the device location and the authorized operating region. If the device is within the authorized region, the method proceeds to block **316**. If the device is not within the authorized region, the method proceeds to block **318**.

[0044] At block **316**, the protection system determines that the device is within the authorized geographic region operates to allow the device to run the application. For example, in one embodiment, the protection system may provide an authorization code to the application that allows the application to execute on the device **102**. In another embodiment, the protection system may provide an authorization code to a network server that authorizes the server to provide requested services to the application. For example, the application may be a gaming application that receives real-time gaming information from the server after the server has received the authorization from the protection system.

[0045] At block **318**, the protection system determines that the device is not within the authorized geographic region and therefore the protection system operates to prevent the application from executing on the device. For example, in one embodiment, the protection system fails to send an authorization code, or in the alternative, sends a disable code to the application that prevents the application from executing on the device **102**. In one embodiment, the protection system fails to provide access to information requested by the application. For example, the protection system fails to authorize a network server to provide information to the application. Thus, if the application is a gaming program, the application will not receive the required real-time gaming information in order to execute properly on the device **102**. As a result, because the device is outside the authorized operating region, the application will fail to execute properly, and therefore the application is protected from distribution outside the authorized region.

[0046] The method **300** may optionally proceed to block **310** if the device user has moved the device into the authorized region and attempts to run the application. At block **310**, the process of determining if the device is with the authorized region begins again. Thus, if the device is moved back into the authorized region, the protection system will allow the application to function as designed.

[0047] **FIG. 4** shows one embodiment of a geographic database **400** for use with the protection system **200** of **FIG. 2**. The database **400** is used by the protection system **200** to map authorized geographic regions to applications by using a geographic indicator. The database **400** comprises a region identifier **402**, an application identifier **404**, and a geographic indicator **404**.

[0048] The region identifier **402** identifies a region in which an application is authorized to operate. For example, the region identifier **402** may define by a region,

country, state, city, district within a city, or any other geographic location. The application identifier **404** identifies a particular application or content that is available for execution on a device. For example, a variety of application types may be available, such as gaming programs, news services, movie or other video content, or audio content.

[0049] The geographic indicator **406** provides a mechanism to map an application to an authorized operating region. The indicator **406** may be generated using any known technique. For example, in one embodiment, a device identifier, the application identifier, and the region identifier are used to form a digital signature that represents the geographic indicator. Any other application or device information may also be used to create the digital signature. During operation of the protections system, the application provides the geographic indicator to the protection system when the user attempts to execute the application on the device. The protection system then operates to generate another signature based on the device's current location. If the signatures match, the protection system allows the application to execute on the device.

[0050] A protection system has been described that includes methods and apparatus to protect applications and content from unauthorized acquisition and/or distribution. The system is suitable for use with all types of wireless devices and is especially well suited for use with mobile telephones operating on nationwide wireless telecommunication networks.

[0051] Accordingly, while one or more embodiments of methods and apparatus for a protection system have been illustrated and described herein, it will be appreciated that various changes can be made to the embodiments without departing from their spirit or essential characteristics. Therefore, the disclosures and descriptions herein are intended to be illustrative, but not limiting, of the scope of the invention, which is set forth in the following claims.

I CLAIM: